

## CLAIMS

1. A membrane electrode assembly for a proton-exchange membrane fuel cell, comprising a polymer electrolyte membrane and an electrode catalyst layer,  
5 wherein at least a part of the polymer electrolyte membrane infiltrates into the electrode catalyst layer, and  
wherein the polymer electrolyte membrane is formed by polymerizing a composition containing at  
10 least a compound having proton conductivity and a compound having activity to an active energy ray, or a composition containing at least a compound having proton conductivity and activity to the active energy ray.
- 15 2. A membrane electrode assembly according to claim 1, wherein a reinforcement member composed of an electrical insulator is provided inside the polymer electrolyte membrane.
- 20 3. A production method for a membrane electrode assembly for a proton-exchange membrane fuel cell, the assembly comprising a polymer electrolyte membrane and an electrode catalyst layer, at least a part of the polymer electrolyte membrane infiltrating into the electrode catalyst layer, the production  
25 method comprising the steps of:  
coating the electrode catalyst layer with a composition containing at least a compound having

proton conductivity and a compound having activity to an active energy ray, or a composition containing at least a compound having proton conductivity and activity to the active energy ray, to form a precursor layer of the polymer electrolyte membrane composed of the composition, at least a part of the composition infiltrating into the electrode catalyst layer; and

polymerizing the composition by irradiating the precursor layer with the active energy ray, to form a polymer electrolyte membrane at least a part of which infiltrates into the electrode catalyst layer.

4. A production method for a membrane electrode assembly according to claim 3, wherein the electrode catalyst layer has a thickness of 0.01 to 200  $\mu\text{m}$ , and an infiltration amount of the composition into the electrode catalyst layer is equal to or smaller than the thickness of the electrode catalyst layer.

5. A production method for a membrane electrode assembly according to claim 3, wherein the composition is coated after a reinforcement member composed of an electrical insulator is provided on the electrode catalyst layer.

6. A proton-exchange membrane fuel cell comprising a membrane electrode assembly for a proton-exchange membrane fuel cell, the membrane electrode assembly comprising a polymer electrolyte

membrane and an electrode catalyst layer,  
wherein at least a part of the polymer  
electrolyte membrane infiltrates into the electrode  
catalyst layer, and

5        wherein the polymer electrolyte membrane is  
formed by polymerizing a composition containing at  
least a compound having proton conductivity and a  
compound having activity to an active energy, or a  
composition containing at least a compound having  
10    proton conductivity and activity to the active energy  
ray.